

FINAL REPORT

Title: ***The Henry Cecil Ranson McBay Chair in Space Science***

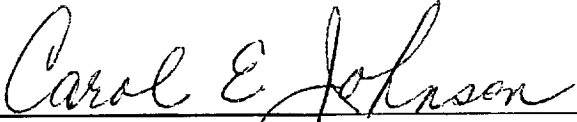
Submitted to: ***National Aeronautics and Space Administration***
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Cooperative Agreement
Number: ***NCC3-454***

Project Period: ***February 26, 1996 - June 30, 1999***

Signature: 
Ms. Carol E. Johnson
Director, Research and Sponsored
Programs

Final Report for the NASA Grant
“The Henry Cecil Ransom McBay Chair in Space Science”

Planned Goals and Objectives

The goals and objectives of The Henry Cecil Ransom McBay Chair in Space Sciences were (1) to provide leadership in developing and expanding Space Science curriculum, (2) to contribute to the research and education endeavors of NASA’s Mission to Planet Earth program, (3) to expand opportunities for education and hands-on research in Space and Earth Sciences, (4) to enhance scientific and technological literacy at all educational levels and to increase awareness of opportunities in the Space Sciences, and (5) to develop a pipeline, starting with high school, of African American students who will develop into a cadre of well-trained scientists with interest in Space Science Research and Development.

Accomplishments Toward Goals and Objectives

Teaching

- During the 1997-98 and the 1998-99 academic year, a new senior level class was introduced in the Atlanta University Center curriculum entitled, “*Introduction to the Space Sciences.*” The class was taught by Dr. James King, Jr., former Director for Engineering and Science at the Jet Propulsion Laboratory. Demonstrated interest for the class was apparent by a 400% increase in class enrollment from the fall semester ’97 compared to the fall semester ’98. Five of the original six students enrolled in Dr. King’s first class were accepted into graduate school and indicated their interest in pursuing careers in the space sciences.
- During the 1997-98 academic year, Dr. King collaborated with Dr. Marlene MacLeish of the NASA Space Medicine and Life Sciences Research Center at Morehouse School of Medicine on the development and implementation of a new course entitled, “*The Human Body in Space.*”

The course, designed to promote an understanding and appreciation of NASA's scientific pursuits in cardiovascular, cell biology and musculoskeletal research, attracted several undergraduate students from AUC. Dr. King was actively involved in the project by serving on the Center's Advisory Board as well as presenting four class lectures on topics such as Space Radiation and the microgravity environment.

- Dr. King provided leadership for the establishment of an interdisciplinary Earth Systems Science Program associated with the Department of Physics at Clark Atlanta University. Working directly with the Senior Research Scientist and Chair of the Physics Department, Dr. Denise Stephenson-Hawk, Dr. King provided on-going support in enhancing the visibility of the department's contributions to Earth Systems Science throughout the scientific community. Courses in Atmospheric Chemistry and Earth Sciences are integral parts of the curriculum at Clark Atlanta University.

Research

- Dr. King serves as a no-fee Co-Investigator for a NASA supported grant at CAU entitled "Curriculum and Research Opportunities for Undergraduates in Earth Systems Science" (ESS) with Dr. Denise Stephenson-Hawk as the Principal Investigator. The ESS grant provided interdisciplinary research opportunities and curriculum modules for students enrolled in Physics, Mathematics, Chemistry, Computer Science and Engineering. In developing the curriculum for the ESS program, it was recognized that students gain a clearer understanding of ESS concepts through inclusion of case studies in their courses. These case studies employ the theory delivered in class and apply it to questions requiring environmental data to formulate solutions to this question.

- Two graduate students conducted research relevant to NASA's overall mission. Lanier Watkins, a Computer Science major, worked on a task to improve image-processing methodologies, which have traditionally used Fourier analysis to accomplish synthesis and compression. The new approach made use of wavelet transform algorithms (continuous and discrete) which may significantly enhance the quality of images.

Tiannia Washington's research focused on the development of applications to improve the properties of material structures. She used an AC Susceptometer and a DC magnetometer to measure some of the electrical and magnetic properties (transport, hysteresis, etc.) of composite systems. She also used a combination of experimental and analytical evaluations to develop a comprehensive assessment of the properties of composite materials.

- Two Morehouse College undergraduate students, Christopher Boxe, a senior and Herdis Adams, a junior, worked with Dr. King in studying the adsorption of gases on interstellar-like grains. The long-range objective was to understand the formation of complex chemical compounds in interstellar space. The technique of Fourier Transform Infrared Spectroscopy (FTIR) was used to study the adsorption of gases like hydrogen (H_2) and nitrogen (N_2) on metal oxides surfaces. For example, Al_2O_3 , SiO_2 , Fe_2O_3 are believed, based on telescopic observations, to be the main components of interstellar grains. During their research, the students learned to use the FTIR spectrometer and assisted in the interpretation of the data. Christopher Boxe, was accepted in the California Institute of Technology's Planetary Sciences Program and Herdis Adams was accepted in the University of Chicago's Space Chemistry Program.

Development and Outreach

- In September 1996, Dr. Wes Huntress, who at the time was the Associate Administrator for Space Sciences for NASA, kicked off the Henry Cecil Ransom McBay Distinguished Lecture Series. Each month, guest scientists, researchers and educators visited the AUC campus and made presentations, which provided the academic and scientific community of Atlanta with a widespread understanding and appreciation of our Nation's scientific pursuits. Twenty lectures comprise the lecture series (see Appendix A).
- A major component of The Henry Cecil Ransom McBay Distinguished Lecture Series was the Secondary Education Outreach Program. This program provided five hundred (500) high school students the opportunity to expand their awareness of NASA's science and technology efforts by allowing the students to (1) attend special lectures and

receptions on the AUC campus, (2) host presentations from McBay guest lecturers at their schools, and (3) receive space paraphernalia including posters, stickers postcards, books, fact-sheets, and autographed photos. Schools that participated in the program are listed in Appendix B.

- The Chaired professorship provided support which included mentoring, making presentations to students and judging technical presentations by the students for two NASA funded programs at AUC: The Women in Science Education (WISE) Program at Spelman College and The Strategic Preparedness Advancing Careers in Engineering/Science Project (Project SPACE) at Morehouse College. Each program serves approximately one hundred (100) students.

Termination

- Since the original grant was for three years, it terminated in 1999. The requested extension was not granted by NASA.

Inventions

No reportable items.

Subcontracts

None.